SOME NOTES ON ANCIENT IDEAS CONCERNING THE DIAMOND.

By J. R. Sutton.

Scholars have devoted much time to the elucidation of the probably large substratum of truth that underlies ancient fables and fancies about the diamond. And scholars of future ages may perhaps be equally industrious in trying to explain the fables and fancies of our own time on the same subject.

One of the most competent of recent discussions of ancient ideas about the diamond is Berthold Laufer's 'The Diamond: a Study in Chinese and Hellenistic Folk-Lore'*; and the following notes are in the nature of a running commentary on his work. I say "competent" in an observational sense; the philology is, of course, beyond me. He establishes the curious fact that although India was the distributing centre of diamonds to Hellas and Rome† on the one hand and to China on the other, the ideas conceived by the Chinese regarding the diamond do not coincide with those entertained in India, but harmonise with those which we find expounded in classical literature.

1. Legend of the Diamond Valley (p. 6).

This legend is adapted in "Sinbad the Sailor," and is an abridged form of a well-known western story, of which the oldest known version is contained in the writings of Epiphanius, *circa* 315–403. The various stories described under this head coincide in general in the fable of a deep and inaccessible valley whose floor is strewn with diamonds. Flesh is thrown into the valley from above; the diamonds adhere to it; the eagles hovering about scent the flesh, pounce down upon it and carry it to their eyries, where the diamonds are recovered—from the droppings, as some writers relate.

The author gives his opinion that the story originated in the Hellenistic Orient, and was probably invented there for the benefit of foreign traders. And he regards it as belonging to the same type of legend as that related by Herodotus in 'Thalia' of the manner in which cinnamon was obtained by the Arabs.

---

* Field Museum of Natural History. Publication 184, 1915.

† Dieulafait in 'Diamonds and Precious Stones,' 1874, accepts the tradition that "the diamonds earliest known to the Romans were furnished by Ethiopia."

A prosaic motive for the story can perhaps be furnished from Kimberley experience. It is said that in the early days of Kimberley the breeding of poultry was a profitable business, for the birds wandering at large over the *débris* from the mines always picked up and swallowed the small diamonds they saw, and the crop of every fowl slaughtered in the place was carefully searched in consequence. Some years ago I saw a diamond of about half a carat which was stated, on the good authority of the owner, to have been taken from a fowl's crop. On one occasion twenty-three diamonds, weighing 5½ carats altogether, were found in the crop of a pigeon which had been shot on the De Beers depositing floors. Ostriches are known to swallow pieces of glass and stone and various bright minerals, and the fact has been invoked to account for the sporadic finds of diamonds along the Orange River.* Strip the legends of their romantic accretions and there is no great difference between them and things that happen. Now that the mining area is enclosed and there is not very much unwashed kimberlite *débris* left people do not bother so much about opening a fowl's crop, but plenty of small garnets and zircons can still be found that way.

In a footnote to the chapter on the "Legend" (p. 16) the author remarks that "The knowledge of the diamond certainly does not go back in India into that unfathomable antiquity as pretended by some mineralogical and other authors. It was wholly unknown in the Vedic period, from which no specific names of precious stones are handed down at all. The word *mani*, which has sometimes been taken to mean the diamond, simply denotes a bead used for personal ornamentation and as an amulet, and the arbitrary notion that it might refer to the diamond is disproved by the fact that it could be strung on a thread." As to that, possibly the notion is an arbitrary one, like many other statements concerning the diamond; nevertheless, natural diamond beads are sometimes found. My own collection, for example, contains a dozen "strung on a thread." One way in which these natural beads can be formed depends upon the fact that diamond crystallises readily about various foreign minerals, such as ilmenite, garnet, zircon, diopside, olivine, iron pyrites,† graphite, etc. When these foreign minerals are not completely enclosed they may often be easily removed or they may drop out of themselves, leaving a hole sometimes extending right through the diamond. The readiness with which diamond crystallises about foreign minerals acts, indeed, to its own hurt, for the inclusion, if complete, invariably cracks the diamond sooner or later, giving rise to the frequent cleavage fragments. Another, though rarer, way in which a natural bead can be formed may arise when a number of diamonds crystallise in a cluster. Suppose, *e. g.*, that two diamonds grow corner to corner (as they often enough do), and that a third grows round the contact. If, then, in the mining or winning they should fall apart the third will appear as a bead. This second way gives the most elegant beads. Not that it is essential that a diamond should be bored through in order that it may be strung on a thread, for it might be mounted on a metal bead. By way of illustration, "it is no uncommon sight to see the natives of Borneo wearing waistcoats ornamented with gold buttons, in each of which a diamond is set." *

---

* *E.g.* "the possibility of the existence of diamond deposits near the junction of the Orange and Vaal was flatly denied by a pretentious examiner who came from England to report on the Hopetown field. It was gravely asserted that any diamonds in that field must have been carried in the gizzards of ostriches from some far-distant region." G. F. Williams, 'The Diamond Mines of South Africa,' p. 122, 1902.

† The "leaf of gold" said to have been seen in the centre of a beautifully crystallised Brazilian diamond may have been pyrites or mica.

In the same footnote is the following: "S. K. Aiyangar calls attention to the fact that the first systematic reference to diamonds is made in the Arthaçāstra of Kauṭilya. He mentions six kinds of diamonds classified according to their mines, and described as differing in lustre and degrees of hardness." It is not clear whether this is really intended to mean that different Indian localities produce different types of diamond, or whether it refers to their grading, named after the castes, as Brahmins, Kshatriyas, etc., just as cut diamonds to-day are classed as Rivers, Jagers, Wesseltons, etc., according to their quality, and irrespective of their proper source. It is well known, of course, that diamonds have a local individuality, and the fact has an important bearing on the problem of their origin. As the accurate John Mawe told us more than a century ago, "The mineralogist who has been in the habit of seeing and accurately examining numerous specimens of this gem acquires a kind of tact that enables him to distinguish at once and with little risk of mistake a *bolsa* of stones from Hindostan, and a similar one from Borneo, or from the Portuguese territories in South America; nay, even the diamonds furnished by one part of the Serro do Frio may be discriminated from those of other parts of Brazil, or even of the same district. But these characters, although sufficiently visible to the experienced eye, are too evanescent to be restricted within technical description, and are as yet entirely unknown to the commercial dealers in precious stones."†

In the same way no person of experience would mistake the source of a parcel of South African diamonds won from one spot. The production of one mine is not like that of any other.‡ An individual stone may be of doubtful origin sometimes; *e. g.* a particularly sharp-edged glassy octahedron from Bultfontein might, seen alone, be mistaken for a Monte Leo stone; but the source of half-a-dozen Bultfontein glassies, taken as they come, would not be in doubt. So experts might differ as to whether one given "rounded" octahedron belonged to Wesselton or Dutoitspan, albeit they would not differ about a number.

---

* G. H. Smith, 'Gem Stones,' 1912, p. 155.

† 'A Treatise on Diamonds and Precious Stones,' 1815, p. 32.

‡ And this is true not only of the diamond, but also of the other minerals forming the kimberlite matrix.

2. Indestructibility of the Diamond (p. 21).

Two cognate stories are given under this head, one from Pliny and the other from Ko Hung (fourth century A.D.):

"Pliny sets forth that the indomitable power which contemns the two most violent agents of nature, iron and fire, is broken by the blood of a ram [? billy-goat, 'hircino'], which, however, must be fresh and warm. The stone must be well steeped in it, and receive repeated blows, and even then will break anvils and iron hammers unless they be of excellent temper."*

According to the Chinese version, "The kingdom of Fu-nan (Cambodja) produces diamonds which are capable of cutting jade. In their appearance they resemble fluor spar. They grow on stones like stalactites, on the bottom of the sea to a depth of a thousand feet. Men dive in search for the stones and ascend at the close of the day. The diamond when struck by an iron hammer is not damaged; the latter, on the contrary, will be spoiled. If, however, a blow is dealt at the diamond by a ram's horn [according to another reading, 'antelope or chamois horn,'] it will at once be dissolved and break like ice."

Pliny may have read the property of toughness into what he had heard of the hardness of diamond. Diamond is anything but tough, and even carbonado, to say nothing of bort, is easily shattered by a blow. Careless handling in steel forceps will chip the edges of brilliants. The Chinese account is evidently a promiscuous mixing of the properties of calcite, quartz, pearl and diamond. But the great hardness of diamond has been exaggerated in modern times. Thus no less a philosopher than Sir John Herschel could describe diamond as "almost infinitely harder than any other substance in nature,"† a statement whose inaccuracy could have been rectified by a reference to Mawe's Treatise then in circulation. Mawe said, acutely enough, that "We know in general that, when two substances, greatly differing in hardness, come into collision, the effect produced by each upon the other is nearly in the ratio of their respective degrees of hardness; the softer one will undoubtedly be the most affected, but the hardest will by no means escape unhurt. . . . With regard to the diamond we have the most authentic testimony that the Chinese and East Indian lapidaries are in the habit of polishing it upon a piece of corundum, the hardness of which is greatly inferior to that of the gem."‡ Even Mawe's assertion that a diamond in his own possession had been so rolled and worn that not a single piece of its natural crystal surface remained has not deterred high living authorities from stating that diamond is seldom found "waterworn."

---

* A newly-rich visitor to the diamond fields knew better: "My 'usband says diamonds are not so 'ard as people say; for 'e put some of mine on a hanvil and 'it 'em 'ard with a 'ammer and smashed 'em hall to hatoms."

† 'Preliminary Discourse on the Study of Natural Philosophy,' 1830, p. 237.

‡ P. 20. Diamonds have been cut and polished in modern times with the powder of crystallised boron—"with entire success" according to Dieulafait.

But is there not just a possibility that Pliny's assertion was founded on something more tangible than a mere confusion of the properties of hardness and toughness? Apart from the well-known fact that diamond would cut iron, is it not a fair guess that some ancient lapidary might have put a diamond into a vice, and so found that the iron might crush, but still suffer somewhat from, the stone?

Sir William Crookes, in the course of his magnificent lecture before the British Association in Kimberley in 1905, performed the experiment of squeezing a diamond into steel. Under the great hydraulic pressure employed (60 atmospheres) the diamond was seen, projected on the screen, to sink into the steel as if that were no more than butter.* While no ancient craftsman could have commanded the same power, it is significant that "Muhammed Ibn Mansūr, who wrote a treatise on mineralogy in Persian during the thirteenth century, says, regarding this point, 'On the anvil the diamond is not broken under the hammer, but rather penetrates into the anvil.'"

Concerning the Chinese account that diamonds are fished from the ocean, the author comments that is an old Indian fable; and in a footnote he adds that the Hindu mineralogists also entertain the notion that diamond floats on water. Yet, while the fable does confound pearls with diamonds, it is fairly certain that diamonds could be fished from the Atlantic off the coast of South-West Africa if the game were worth the candle. Moreover quite large fragments of diamond will float provided that their spread is great enough compared with their thickness. It is a simple and a very pretty experiment to float a flake of diamond on water, and then, glancing along the surface of the water, to see that the whole of the diamond is much below the general level—hanging suspended, as it were, in a bag from the surface.

I gather that the author favours an astrological signification for the blood and the ram's horn part of the stories. As in Gower:

> "The sterre ellefthe is Venenas
> The whos nature is, as it was,
> Take of Venus and of the Mone
> In thing which he hath forto done.
> Of Adamant is that perrie
> In which he worcheth his maistrie."†

But the handles of some of the lapidary's tools might have been of horn.

---

* This diamond, deeply embedded in the steel, is still preserved in the sorting office of the De Beers Company. The experiment may be imitated, more or less successfully, with an office letter-press.

† 'Confessio Amantis.' Bk. VII.

3. Diamond and Lead (p. 26).

The idea that diamond could be attacked and subdued by lead appears to have originated in Greece, and to have been adopted afterwards by the whole world. Underlying the idea the author works out the hypothesis[*] that diamond was wrapped in lead before being broken into engraving points, in order that none of the fragments should be lost. It may be added that diamond might have been put into a vice for the same reason. Mediæval writers introduced into the story something allegorical. Thus Philip de Thaun, in his Anglo-Norman 'Bestiary,'[†] *circa* 1130:

> "E çes sacez vereiement que l'en l'adamas bruist en fent,
> Par le sanc de buc e de plun, signefie grant raisun.
> Seignurs, aez i entente, bucs est beste pulente;
> Par le sanc de buc entendum en nostre lai corruptiun;
> Par plum entendum peché par quei hom sunt enginné;
> Ke li plums paise que fer, ki pechurs traite en emfer;
> Corruptiun a pechet nus fent, ⁊ encontre Deus nus ofent.
> E cel vertu ad en sei, le fer trait od sei;
> Signefie que Christiens traient à la lur lei paens,
> Quant il laissent lur eresie, e creient el Fiz Sanctae Marie."

[And this know truly that they break in pieces the diamond,
With goat's blood and lead, it signifies a great matter.
Lords, pay attention to it, a goat is a stinking beast;
By the blood of the goat we understand corruption in our law;
By lead we understand sin by which men are ensnared;
That the lead weights the iron which draws sinners to hell;
Corruption and sin splits us and makes us offend against God,
And this virtue it has in it, it draws the iron with it;
It signifies that Christians draw Pagans to their law
When they leave their heresy and believe in the Son of St. Mary.]

4. The Diamond Point (p. 28).

The only circumstance we shall notice under this head is the old and persistent idea of a mysterious association between diamond and iron.[‡] This matter has been discussed in "Kimberley Diamonds, especially Cleavage Diamonds,"[§] under the heading "Stewartite." Stewartite more than revives the idea of the same mysterious association, combining as it does the properties of diamond and loadstone. John Lyly, in 'Euphues and His England,' 1580, expresses the current conventional idea of his time concerning the *antipathy* between the loadstone (*adamant* in this case) and the diamond: "For as it is impossible for the best *Adamant* to drawe yron vnto it if the *Diamond* be neere it . . ." That there is no such antipathy is only a proof of the rarity of the diamond in Tudor times, and of the abiding influence of Pliny.

---

[*] Suggested, perhaps, by modern practice in the cutting factories.

[†] Edited by Thomas Wright, 1841, p. 125.

[‡] *Cf.* L. Pearsall Smith in 'The English Language,' N.D., p. 160: "*Phœnix,* the name of an imaginary bird, and *adamant,* used in literature to describe a half fabulous rock or crystal, combining the qualities of the diamond and the loadstone, were, with the earlier *drake* (dragon), the first of the names of the legendary animals and jewels to reach us from the East."

[§] Sutton, 'Trans. Roy. Soc. S. Afr.,' 1918.

5. DIAMONDS AND GOLD (p. 35).

"Qazwīnī speaks of an amicable relationship between gold and the diamond, for if the diamond comes near gold, it clings to the latter; also it is said that the diamond is found only in gold mines."

Pliny mentioned a casual relationship, but in such a way as to lead to the inference that the similar crystallisation was implied, seeing that gold is indeed occasionally found in small octahedral crystals. As usual his followers copied him uncritically; and hence we have the Chinese compound *kin-kang*, which, the author argues, is traceable to classical antiquity, and really means "the hard stone originating in gold."

Diamond and gold are not found in association in the river diggings of Griqualand West, although some diamonds are obtained from the Rand banket.* The latter are nearly all green, varying from light bottle green to dark olive. The colour has been attributed to the action of radium, but some typical specimens tested by me showed no signs of radioactivity. In the clearer specimens of these the colour is seen to be derived from included streaks of green and yellowish-brown foreign matter much too dense to be due to finely divided gold. Mawe reported some very fine superficially green diamonds from Brazil. Occasional superficially green diamonds are found in the Kimberley area, and now and then one meets with olive green laminated stones in Koffyfontein; also diamonds from the Eland mine have a faint greenish cast, none of these being now associated with gold, if they ever were. The genetic relationship between diamond and gold is clearly not so intimate as that between, say, diamond and magnesium, to some combination of which the coloration of diamond may hypothetically be ascribed.

That Pliny, when he spoke of adamas as a name given to a crystal of gold, was only referring to outside appearances, seems to be proved by the six sorts of adamas which he cites as coming from various localities; for evidently he was quite aware that not all these had the same physical characters. He was no more in error than the jewellers who sell Scotch Topaz, Cape Ruby, Water Sapphire, Cornish diamonds, etc., nor than the mineralogists, who call a diamond macle a "spinel twin." And he has not perhaps been always happy in his translators. Bostock and Riley render his "sexangulo" by "hexangular and hexahedral,"† Boutan by "six côtés."

---

* See R. B. Young, 'The Banket,' 1917, p. 35.

† "No body, of course, can simultaneously be hexangular and hexahedral, the hexahedron being a cube with six sides and four points"! (Laufer, p. 44).

6. Imitation Diamonds (p. 41).

The author quotes the following from the 'Agastimata': "When a connoisseur believes that he recognises an artificial diamond, he should test it by means of acids or vinegar, or through the application of heat: if false it will lose colour; if true it will double its lustre." Chinese authorities echo the same advice.

Neither the acids known to the ancient Indian or Chinese chemists, nor heat, would be sufficient in every case to detect a false stone, especially if it be colourless. The colour of South African zircons is easily removed in the flame of a spirit lamp, and this test is decisive as regards fragments of zircon and diamond of the same yellowish-brownish colour, which are not easy to discriminate by the eye. In general the hardness and specific gravity will decide. Acids (and sometimes the flame), by removing coatings of foreign matter, improve the appearance of some rough diamonds amazingly. Parcels of South African diamonds are always cleaned in acid (hydrofluoric or aqua regia) and spirits of wine before being sorted for shipment to Europe.

7. Stones of Nocturnal Luminosity (p. 55). Phosphorescence of Precious Stones (p. 63).

The author inclines to the opinion that the various Greek and Chinese legends of night-shining gems do not necessarily prove that the phosphorescence of the diamond was a recognised phenomenon: "Altogether we have to regard the traditions about gems luminous at night, not as the result of scientific effort, but as folk-lore connecting the Orient with the Occident."

One would be inclined to doubt, in fact, whether, if the property of phosphorescence had not been established, anyone at all would have read into the accounts that have come down anything more than a mere fairyland exaggeration of the light-catching power of diamond. It is remarkable how strongly a cut diamond seems to catch stray feeble rays at night, even starlight, when other gems remain obscure. Some rough diamonds have the same property, though in a much less degree.

Phosphorescence, contrary to belief,* is not a general property of diamonds. I have examined a hundred or more Kimberley diamonds (after having exposed them to sunlight) without detecting it. Le Bon exposed about a hundred diamonds, said to be one half Brazilian and the other half Cape, to the illumination produced by burning magnesium, and found that "nearly all the Brazilian and all those of the Bahia mine were, during the operation, brightly phosphorescent, as much so as an isolated fragment of sulphide of zinc. Not one of the Cape diamonds was phosphorescent. The non-phosphorescence of the Cape diamond is, however, not absolute, for after one has remained in the dark for at least twenty minutes in order to rest the eyes . . . a very slight phosphorescence on nearly half of them is detected. This phosphorescence is on the border of the perceptible minimum of light."* Le Bon attributes phosphorescence to the presence of infinitesimal proportions of certain foreign bodies. He claims that Bahia diamonds are worth 40 per cent. more than Cape diamonds, apparently meaning those of one colour and size: "Cape diamonds, often as colourless as those of Brazil, and sometimes larger, are always very inferior to the Brazilian, not only by their hardness but also by their brightness." If this statement were true—and it wants a deal of proving—we should have to admit that the superior qualities of the Brazilian stones arise from the presence of impurities. "Sometimes larger" is good. Crookes, in his Kimberley lecture, remarked that "some diamonds are fluorescent, appearing milky in sunlight. In a vacuum, exposed to a high-tension current of electricity, diamonds phosphoresce of different colours, most South African diamonds shining with a bluish light. Diamonds from other localities emit bright blue, apricot, pale blue, red, yellowish-green, orange, and pale green light. The most phosphorescent diamonds are those which are fluorescent in the sun. One beautiful green diamond in my collection, when phosphorescing in a good vacuum, gives almost as much light as a candle. . . . Diamonds which phosphoresce red generally show the yellow sodium line superposing on a continuous spectrum. In one Brazilian diamond phosphorescing a reddish-yellow colour, I detected the citron line characteristic of yttrium."

---

* "They say the proof of a true diamond is to glitter in the dark" (Dryden's 'Amphitryon,' III). "E çeo dit Phisologus que adamas ad vertut plus . . . pur nuit gete grant luur" (P. de Thaun).

In the remarkable mixture of truth and error contained in the old writings discussed by Laufer it is not altogether improbable that the language was framed, in the first instance, to hide trade secrets, and with deliberate intent to deceive. The persistence of the stories was only an aspect of the dominion of classical literature over the thought of the middle ages, and, moreover, the guild interests of lapidaries and alchemists were concerned in keeping the half truths and errors alive. The alchemists knew a good deal more, no doubt, than they told to outsiders. Soddy, indeed, has argued that they knew something about radium.

---

* 'The Evolution of Forces,' 1908, p. 233.